



The Oasis

Fall/Winter 2016

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The Oasis is published twice a year for Mojave Desert Network park staff and anyone else interested in resource management in the Mojave Desert Network parks.
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Paleohydrology and Changing Climate in Desert Wetlands: Can the past help us predict the future?

The changing climate and current climate change predictions are a serious management concern for national park units all across the country. Increases in temperature and decreases in rainfall threaten plants and animals living in and around small desert springs and wetlands across the southwest. These plants and animals rely on springs and wetlands to supply them with much needed water throughout the year. In the Mojave Desert Network, there are several endangered and iconic species that depend on these fragile water sources to survive, including the Mohave tui chub, relict leopard frog, and several springsnails found nowhere else in the world.

The [MOJN I&M Desert Springs Monitoring](#) efforts (Fig. 1) assist park management in keeping an eye on the health of these springs and spring-dependent species. By taking frequent, standardized measurements of water quality and quantity at numerous springs across the network's parks, we will be able to detect if the health of

the springs is changing on seasonal and annual time scales. We can then alert park management of any changes, which helps them make timely, informed decisions about the protection of these fragile ecosystems.

But there is a lot more of this story yet to be uncovered, and it begins with the geologic record. Can we learn how these desert wetlands may have responded to changes in climate that happened in the past? And if so, would that help us understand the risks these water resources face now and into the future? Through their research on the paleohydrology (paleo = ancient, hydrology = study of water) of desert springs, geologists [Jeff Pigati and Kathleen Springer of the U.S. Geological Survey \(USGS\)](#) are attempting to answer those exact questions.

Working in cooperation with the NPS, they are looking at geologic deposits associated with springs and wetlands in the Mojave Network parks in order to determine how these systems responded to changes in climate in

Program Manager's Corner

Allen Calvert Says Hello

It is with great excitement that I provide my introductory message for the MOJN I&M newsletter. It has been a little over three months since I took on this position, and the term "drinking from the firehose" is a pretty accurate description of how much information I have been trying to take in as I grasp the full responsibility that is ahead of me. The good news is that I feel like the firehose might only be set at half way now! I have been able to visit six of the nine park units in the network so far. Three of which (GRBA, JOTR, and CAMO) I had never been to before. I have been able to meet a fair number of park staff from these parks, and I have been very appreciative of their patience and the time they have taken to meet me and provide me with background on each of their parks.

I was also able to attend the I&M program managers meeting and workshop in October and I came away with a really good viewpoint of the I&M program at that larger scale and how MOJN fits into the greater scheme. The number one thing I think I have learned so far is that we have a great staff of scientists that love what they do, and get the job done safely and timely. One of the priorities I learned before I even started was the need to fill our vegetation ecologist position. We sorely need someone that can come in and evaluate our vegetation protocols, and also work with our crews to ensure we are both collecting the right data and are able to analyze that data and get it out to the parks. If that wasn't enough, I now have to fill the very large shoes that Geoff Moret has left as our hydrologist. Geoff was the network's longest standing employee, and had developed all of our hydrology focused protocols. We hope to have our new ecologist in place by mid January however, other priorities may prevent us from hiring a new hydrologist for an undetermined amount of time.

In addition to my goal of getting out to all of the park units and meeting the superintendents and their staff, I am also hoping to collaborate more with the parks to provide additional information and skills that will benefit I&M and the parks. We are also looking to collaborate and coordinate more with other I&M networks. One such project was already in the works before I got here - we are working with I&M staff from the Upper Columbia Basin Network and staff from GRBA to implement pine vegetation monitoring at that park and potentially incorporate similar monitoring at other parks in the network in the future. Once we are close to being fully staffed, I believe we will be able to provide some great service to our network parks. I think 2017 will be a busy and productive year for MOJN, and I am excited to see what we can accomplish! I just wanted to close this message with an open invitation for anyone that has questions or comments about the I&M program in the MOJN network to please don't hesitate to contact me.

Have a very happy holiday season!

- Allen Calvert, MOJN I&M Program Manager



Above: Allen assists MOJN I&M field staff and GRBA park staff with data collection for Lakes Monitoring week in September.



Left: Allen attends the Desert Springs Monitoring field season kickoff at JOTR this past October. He also had a chance to meet the Superintendent and other park staff during the Field Season Kickoff Meeting.



Figure 1: MOJN I&M does water quality monitoring at a handful of desert springs at the MOJN parks four times a year to ensure any unexpected changes in the health of this spring are detected and park management is made aware as quickly as possible.

the past. At many times during the Pleistocene (the past ~2.6 million years), the Mojave Desert was much cooler and wetter than today. Springs flowed, wetlands expanded, Ice Age megafauna thrived, and sediments were trapped and preserved in the geologic record.

To the trained eye, wetland deposits reveal information about the timing and magnitude of water-level changes. Jeff and Kathleen examine the depositional environment, the spatial arrangement and different types of spring deposits, and the fossils found in these layers (Fig. 2).



Figure 2: Kathleen Springer, USGS, examines a sequence of wetland deposits in the Las Vegas Valley.

Even subtle variations in color, texture, and grain size can tell them what the landscape was like at different times in the past, how much water was present at the time, and what animals were using these sources as a watering hole. The age of the deposits and the entombed fossils are determined (Fig. 3) using radiocarbon and luminescence techniques, revealing the timing of the multiple discharge intervals. Ancient water table levels at these sites can be identified to within a few centimeters!

So what can this research tell us? Analyzing deposits that span the last 300,000 years has shown that desert

wetlands have been extremely responsive to climatic shifts in the past. Water levels responded almost instantaneously to warming events, and decreased



Figure 3: Fossils of a juvenile Columbian mammoth weathering out of late Pleistocene wetland deposits in Tule Springs Fossil Beds National Monument, southern Nevada.

precipitation immediately affected how much water was present at the springs. Studying how these past wetlands behave under natural conditions allows us to determine the "normal" range of fluctuations that these springs are capable of. In addition, determining the range of temperature thresholds can tell us what parameters these springs can be maintained in without the risk of losing them forever.

Jeff and Kathleen are currently doing research on springs and wetlands at TUSK, MOJA, and JOTR, and will be collecting drill cores near Saratoga Spring in the southern end of DEVA this upcoming February (Fig. 4). [Their work](#), in combination with the MOJN I&M Desert Springs



Figure 4: Saratoga Spring in Death Valley. This spring is monitored quarterly by MOJN I&M. Jeff and Kathleen will be collecting drill cores near this spring for their research in February.

Monitoring efforts, will provide critical information to assist NPS management of these fragile ecosystems throughout the national park system.

- Janel Brackin, MOJN I&M Science Communicator

Staffing Changes: Hail and Farewell

Hail...



Allen Calvert

MOJN I&M has a new Program Manager! Allen Calvert joined the Network team in

September, having previously worked for the Bureau of Reclamation since 2005. His most recent position was as a senior level biologist for the Lower Colorado River Multi-Species Conservation Program. In that position, he oversaw research and monitoring efforts of a variety of mammals and amphibians. Namely, four bat, three rodent, two frog, and one toad species. He also served as the monitoring coordinator for three habitat conservation areas. Allen is currently working on his M.S. in Environmental Policy and Management from the University of Denver. He is looking forward to working for the Mojave Network parks in the coming years.



Carissa Wilkerson

Carissa joined the Network in August as a Physical Science

Technician. She will be assisting with water quality monitoring of springs, streams and lakes within our network parks. Currently, she is revising water quality SOP's and searching for new and improved water quality instruments. Carissa received her B.S. in Marine and Environmental Science from Hampton University and an M.S. in Marine Science (physical oceanography concentration) from the Virginia Institute of Marine Science, College of William & Mary.

Transitions: From Interns to Parkies...



Michael Steiner

Does this face look familiar? Last year, Michael began

working as a Geoscientist-in-Parks Intern at the Network, assisting Geoff Moret with stream discharge at Great Basin. He has recently been offered a full time term position as a Physical Science Technician! Michael will continue working on the water-related protocol efforts, including desert springs monitoring and streamflow discharge as well as assisting with the network's other protocols.



Sarah Wright

Sarah is back! This time with a term position as MOJN I&M's

Assistant Data Manager. She previously worked for the MOJN for one year as an SCA Data Management Intern. Between her internship and her current position, she worked for the University of California Cooperative Extension (UCCE) Coho Salmon Monitoring Program doing fieldwork and assisting with data management. She is currently helping write data management SOPs for the Invasive Plant Species/Early Detection Plan and will also assist Mark Lehman with the development of Selected Large Springs and Riparian Vegetation databases.

and Farewell...



Geoffrey Moret

It is with great pride (and sadness) that we announce Geoff's departure from the MOJN I&M and the NPS.

He has accepted a position as the Southern Nevada Studies Unit Chief with the U.S. Geological Survey's Nevada Water Science Center. Geoff was the longest standing Network employee - working for MOJN I&M for 7 years. He has played a very large role in developing the Program from its infancy. MOJN I&M thanks him for his dedication and commitment to the Program.



Barb Nelson

This past July, MOJN I&M Admin. Assistant Barb Nelson accepted a position as a Procurement

Tech with the Lake Mead Major Acquisition Buying Office (MABO). After over two years helping MOJN I&M with all things Admin, her expertise will be missed.



David Gundlach

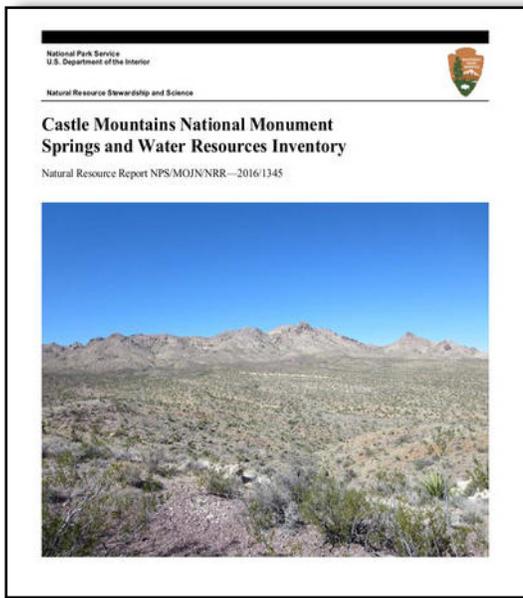
David has been the GIS Specialist at MOJN I&M for nearly 4 years. He just accepted a position in Boulder

City working for the BOR as a GIS Specialist in the Lower Colorado River Multi-Species Conservation Program. He starts in the new year. We wish him the best in his new position. Keep in touch, David!

2016 MOJN I&M Program Updates

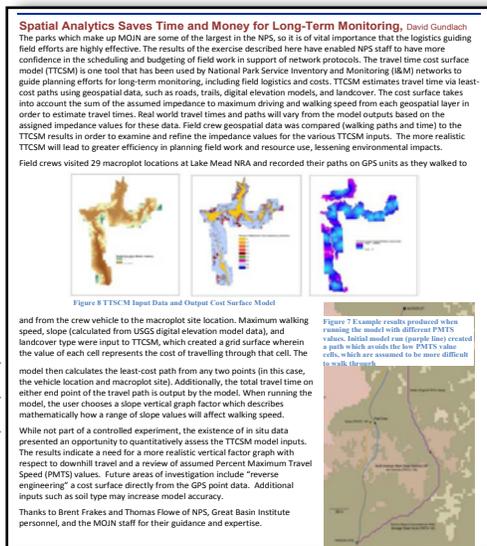
Overall Program Updates & Recent Publications:

- **Data Management:** Implemented improvements to the [Park-specific pages on the MOJN website](#). Developed a SQL Server database for Desert Springs monitoring data. Continued testing and documenting best uses of ArcCollector and Survey123 for field data collection and data sharing. Continued hosting quarterly DM and GIS working group calls with the MOJN Parks.
- **Science Communications:** MOJN I&M Network Communication Implementation Plan currently being reviewed by parks.
- **Landscape Dynamics:** MOJN I&M submitted custom areas of analyses to the Inventory & Monitoring Division (IMD) office for renewable energy projects for JOTR, and for Bighorn Sheep for JOTR, DEVA, LAKE, and MOJA.
- **Invasive Plant Species / Early Detection (IPSED) Plan:** The plan is in final preparations for external review. Data management and monitoring plan roll-out scheduled for mid-year 2017.
- **Riparian & Spring Vegetation Protocol:** Springs at JOTR, LAKE MOJA, and PARA were visited for sampling method development. DEVA springs will be visited early 2017. Protocol development and field testing at an expanded set of springs will continue in Jan-Feb 2017.

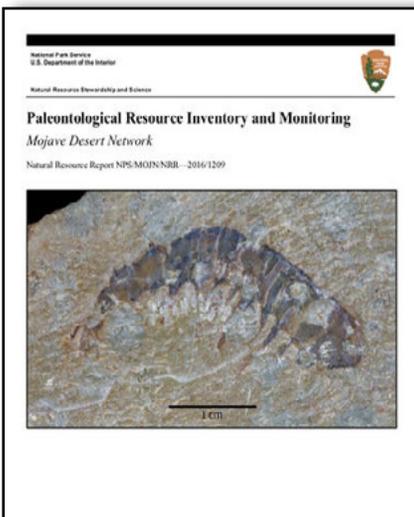


[Castle Mountains National Monument \(CAMO\) Desert Springs and Water Resources Inventory](#) has been published.

“Spatial Analytics Saves Time and Money for Long-Term Monitoring” article written by MOJN GIS Specialist David Gundlach was included in the [National Park Service’s Geospatial Insights 2016 July/August newsletter](#) (page 6).



[An Evaluation of Temperature and Precipitation Data for Parks of the Mojave Desert Network](#) report has been published.



An [updated Paleontological Resource Inventory & Monitoring Summary](#) report for the MOJN parks has been published.

Want to learn more about natural resource science within the national park system and how I&M data contributes to natural resource stewardship in the NPS? [Check out the special NPS Centennial edition of Ecosphere, official newsletter of the Ecological Society of America here!](#)

2016 MOJN I&M Park-Specific Updates

Death Valley National Park:

- **Weather & Climate:** Snow gauge for Rogers Peak to be installed by DRI in December.
- **Desert Springs:** Monitoring anticipated in winter of 2017-2018.
- **Selected Large Springs:** Macroinvertebrate and springsnail samples will be collected from major springs in early 2017.

Lake Mead National Recreation Area:

- **Vegetation Mapping:** [LAKE Vegetation Map Report now published.](#)
- **Desert Springs:** Monitoring of all springs carried out in 2015-16 with assistance of LAKE Aquatic Ecology crew. Report is pending.
- **Integrated Uplands:** Eight macroplots in the creosote community were revisited with the intent to provide Quality Assurance data to allow the MOJN ecologist to evaluate inter-crew and inter-year variability.

Joshua Tree National Park:

- **Selected Large Springs:** Geoff Moret reviewed groundwater data collected near the Oasis of Mara and prepared a report discussing the decline of the water table. [Click here to access the report.](#) Biennial invertebrate samples were collected from the springs. Quarterly monitoring of Fortynine Palms Oasis and Smithwater Canyon Springs continues.
- **Desert Springs:** Monitoring season currently ongoing (Nov 2016 - Feb 2017).

Parashant National Monument:

- **Selected Large Springs:** An invasive snail (*Physa acuta*) was discovered at Pakoon Springs. [Geoff Moret describes Physa snail monitoring at PARA in this video.](#) Monitoring of Tassi and Pakoon continues.
- **Desert Springs:** All 10 annually monitored desert springs were visited this year.

Great Basin National Park:

- **Streams & Lakes:** Eighth year of Streams & Lakes monitoring completed. The FY15 Report is close to publication.
- **Integrated Uplands:** Monitoring tentatively planned for summer 2017.
- **Pine Monitoring:** GRBA and MOJN are collaborating with the [Upper Columbia Basin I&M Network](#) to implement pine monitoring at GRBA and initial field testing will occur in summer of 2017.

Mojave National Preserve:

- **Desert Springs:** Monitoring of all springs carried out in 2015-16. Report is pending. Ten springs to be revisited in early 2017.
- **Selected Large Springs:** Quarterly monitoring of MC Spring continues.
- **Integrated Uplands:** Vegetation community was changed upon park request from Joshua tree woodland to mixed creosote shrubland in order to provide data more relevant to the evaluation of grazing impacts.

Manzanar National Historic Site:

- **Integrated Uplands:** All three of the IU plots established in 2012 in the rabbitbrush community in MANZ were revisited this year.

Tule Springs

National Monument:

Because it is a new park unit, there is currently no active I&M monitoring going on in TUSK. Stay tuned!

Castle Mountains National Monument:

Because it is a new park unit, there is currently no active I&M monitoring going on in CAMO. Stay tuned!

- **Data Management:** New CAMO-specific webpage on the MOJN I&M website coming soon.
- **Desert Springs:** Field reconnaissance visits to springs were conducted October 2016. [Read the published inventory of the CAMO springs here.](#)

Spring 2017 Field Activity Schedule

	Jan	Feb	March	April	May	June	July
Integrated Uplands Vegetation monitoring					GRBA (tentatively planned)		
Streams & Lakes monitoring					GRBA		
Desert Springs monitoring	JOTR MOJA	JOTR PARA	PARA				
Selected Large Springs quarterly monitoring	LAKE DEVA	DEVA PARA	JOTR MOJA LAKE			JOTR MOJA LAKE	
Riparian & Spring Vegetation monitoring	<i>Methods testing at various parks throughout Spring 2017</i>						

What is the MOJN I&M Program?

The Mojave Desert Network Inventory and Monitoring (I&M) Program is one of 32 networks of parks established under the National Park Service I&M Division to implement long-term ecological monitoring across multiple park units that share relatively similar ecological attributes. Data collected through this program will help inform park resource management decisions.

MOJN I&M does monitoring at 9 national park units:

CAMO: [Castle Mountains National Monument](#)
 DEVA: [Death Valley National Park](#)
 GRBA: [Great Basin National Park](#)
 JOTR: [Joshua Tree National Park](#)
 LAKE: [Lake Mead National Recreation Area](#)
 MANZ: [Manzanar National Historic Site](#)
 MOJA: [Mojave National Preserve](#)
 PARA: [Grand Canyon-Parashant National Monument](#)
 TUSK: [Tule Springs Fossil Beds National Monument](#)

(click on the [hyperlinks](#) to learn more about each park)

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